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### Committee G03 on WEATHERING AND DURABILITY

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## Subcommittee G03.09 – Radiometry Meeting Minutes – January 23, 2007, Fort Lauderdale

1. The meeting was called to order at 10:00 AM by G. Zerlaut. There were 11 members and 15 visitors present. Minutes from the June 2006 meeting were approved as published. The agenda was approved as presented.

| Members        |                        | Visitors    |                             |
|----------------|------------------------|-------------|-----------------------------|
| O. Cordo       | Atlas WSG              | T. Allie    | Q-Lab                       |
| M. Crewdson    | Q-Lab                  | R. Bechtel  | Shepherd Color              |
| D. Grossman    | Q-Lab                  | G. Cornell* | Q-Lab                       |
| L. Jacques     | DuPont                 | P. Feyhl    | Heraeus Electro-Nite        |
| W. Ketola      | 3M                     | M. Friday   | Q-Lab                       |
| D. Myers       | NREL                   | M. Garrow   | Valspar                     |
| J. Robbins III | Arizona Desert Testing | D. Kordich  | Washington Penn Plastics    |
| A. Schoenlein  | Atlas MTS              | D. Nester   | Certaanteed                 |
| K. Scott       | Atlas MTS              | K. Osman    | Automotive Materials Assoc. |
| N. Searle      | Consultant             | L. Pattison | BASF                        |
| G. Zerlaut     | SC International       | D. Smith    | Bayer Material Science      |
|                |                        | T. Smith    | Bayer Material Science      |
|                |                        | D. Warfel   | Washington Penn Plastics    |
|                |                        | K. White    | 3M                          |
|                |                        | E. Ziegler  | Andersen Corporation        |

\* add to subcommittee roster

2. Chairman Zerlaut announced that this meeting will be a joint with CIE Committee 2-17. Those indicating participation in the CIE Committee 2-17 meeting were Cordo, Grossman, Ketola, Myers, Scott, and Zerlaut.
3. W. Ketola provided a summary of the status of standards that are the responsibility of subcommittee G3.09, which are all up to date. These standards are:

|         |  |
|---------|--|
| E816-05 | Standard Test Method for Calibration of Pyrheliometers by Comparison to Reference Pyrheliometers |
| E824-05 | Standard Test Method for Transfer of Calibration From Reference to Field Radiometers             |

|           |  |
|-----------|--|
| G130-06   | Standard Test Method for Calibration of Narrow- and Broad-Band Ultraviolet Radiometers Using a Spectroradiometer |
| G138-06   | Standard Test Method for Calibration of a Spectroradiometer Using a Standard Source of Irradiance                |
| G167-05   | Standard Test Method for Calibration of a Pyranometer Using a Pyrheliometer                                      |
| G173-03e1 | Standard Tables for Reference Solar Spectral Irradiances: Direct Normal and Hemispherical on 37° Tilted Surface  |
| G177-03e1 | Standard Tables for Reference Solar Ultraviolet Spectral Distributions: Hemispherical on 37° Tilted Surface      |
| G183-05   | Standard Practice for Field Use of Pyranometers, Pyrheliometers and UV Radiometers                               |

G. Zerlaut reported that the National Fenestration Rating Council (NFRC) uses the direct normal solar radiation spectrum described in ASTM E891 for the calculations used to rate windows. ASTM E891 has been replaced by ASTM G173, which uses a more realistic value for the aerosol optical depth (AOD) of the atmosphere than E891 (AOD for G173 is 0.08 compared to 0.8 for E891). This difference results in a 20% increase in the total direct beam irradiance. This AOD difference does not change the hemispherical spectrum much because the aerosols scatter solar radiation, which is included in the hemispherical spectrum. Zerlaut noted the Dr. C. Gueymard, who developed the SMARTS2 algorithm upon which ASTM G 173 is based, has contacted the NFRC with an alternate approach for rating windows.

G. Zerlaut reported that Dr. Ross McCluney of the Florida Solar Energy Center is working on an ASTM standard regarding UV damage from solar radiation through windows. Zerlaut and/or Dr. Gueymard will contact him regarding this work, and how it might relate to the standards that are the responsibility of subcommittee G3.09.

#### 4. Future activities

Broad band filter radiometers have inherent errors whenever they are used to measure solar radiation with a spectrum that is different from the spectrum used for calibration. This is called spectral mismatch. Broad band radiometer (e.g. full UVB or full UVA – or both) have this spectral mismatch, which creates problems in accuracy of measurements. The solar spectrum differs greatly in summer and winter. These errors will generally cause you to underestimate UVB radiation in fall and winter if radiometer was calibrated in summer. Radiometers are normally calibrated to xenon or summer solar radiation. It is possible to use solar Air Mass to correct the spectral mismatch errors, either manually or using an algorithm programmed into a PC. Zerlaut has developed a technique that can be proposed as a standard. There was a consensus that this would be a very helpful standard. Zerlaut committed to preparing an initial draft for discussion at the June 2007 meeting.

5. CIE TC/2-17 meeting

At the CIE TC/2-17 meeting held in June, it was agreed to solicit information on atmospheric and other parameters necessary for standard solar spectra for specific applications, such as high atmosphere, windows, solar protection, etc. Since the June meeting, no information has been received.

Since the solar spectra defined in CIE 85 are based on a solar radiation algorithm that is no longer available and not verifiable, there has been a need to develop a new set of standard solar spectra. There are two options for updating CIE 85: (1) Discard CIE 85 and start over or (2) use same atmospheric parameters used in CIE 85 as inputs to SMARTS and regenerate the numerous spectra. This would be published as part 1 of new CIE document. Subsequent parts for specific applications (e.g. fenestration, sunscreens, space, etc.) would then follow when the atmospheric and other parameters important for these applications are agreed upon. Zerlaut showed comparisons between CIE 85 spectra and SMARTS2 generated spectra that were prepared by D. Myers. There is very good agreement between them, although the SMARTS2 based spectra have much better resolution and provide spectral data down into the short wavelength UV-B region. Daryl Myers described several approaches to modify SMARTS spectra to determine CIE 85 Table 8. One is a “short cut” method using comparisons of clear sky and cloudy spectra in CIE 85 and calculate a spectral correction factor to apply to a SMARTS2 generated clear sky spectrum. The second option is to use MODTRAN algorithm, which is very laborious. Myers volunteered to prepare SMARTS2 spectra for CIE 85 Tables 6 and 8. Those in attendance agreed that option 2 (use the CIE 85 atmospheric parameters with SMARTS2 solar algorithm) would be the best approach.

5. Announcements

A full meeting of CIE TC 2-17 must meet this fall in Europe. Target is around 24 September in Paris. Potential conflicts are the ISO/TC61 meeting from 15-22 September in Goa, India and a major UV radiation conference in Davos, Switzerland from 18-20 September. More information about this conference is available at:  
<http://www.pmodwrc.ch/uvconf2007/index.htm>

There was no other business brought forth and the meeting was adjourned at 10:52 AM.

Respectfully submitted,  
Warren D. Ketola